



Newsletter

Volume 16, Number 3
May - June 1999

Editor's Note

IES display gardens entertain and enlighten. Visit often!

Perennial Garden: If summer is as dry as spring was, the cool green of the Water Garden will be a welcome respite, and lessons learned in the Xeriscape Bed will prove useful.

Fern Glen: The spires of *Clethra alnifolia* (summersweet) attract hummingbirds and bumble bees, as well as a host of other insects. Its flowers open from the bottom of the spire to the top. As old flowers on the bottom age and the unfertilized eggs mature, new flowers higher up still have pollen maturing. Insects flying from the top of one spire to the bottom of another cross pollinate • *Eupatorium maculatum* (Joe-Pye-weed) grows as high as 10 feet tall. Heads of dusky pink flowers attract butterflies, and the whorled arrangement of leaves maximizes photosynthesis •

Bumblebees flock to *Gentiana clausa* (closed gentian) when it blooms in late August.

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The Eighth Cary Conference Confronts the Urban Frontier

It wasn't very long ago that just about everybody's idea of an ecosystem was a "natural" environment — forest, field, lake, stream, ocean, beach, no people, no buildings. But, "Wait," said some pioneering ecologists, "Aren't cities ecosystems?" After all, there are animals in cities — people, and people's pets and people's pests (not to mention all the creatures that crawl under, walk through and fly over) — and there are trees, and houseplants and roof-top gardens, and weeds that fight for life in sidewalk cracks and concrete schoolyards. Cities have all the physical requisites for an ecosystem as well: the air may not be crystal clear, the sun may not shine as directly, and the rain may flood gutters instead of streams, but all the components are there.

Institute of Ecosystem Studies ecologists were among the first scientists to recognize the reality of cities as ecosystems. "Long before it was popular to be interested in urban ecosystems," says IES Director Dr. Gene Likens, "the Institute was developing programs to understand the relationships among humans, forests and cities." Some of the first comprehensive research on urban forest ecosystems was done by IES ecologists in a remnant of the original forest that covered New York City; the 1991 Cary Conference focused on humans as components of ecosystems; and, in October 1997, IES scientists received a National Science Foundation grant to do a long-term ecological research project in metropolitan Baltimore*.

Now, under the leadership of Dr. Alan Berkowitz, IES Head of Education, an international conference has brought together ecologists, educators, economists, anthropologists, sociologists and geographers to develop strategies for better understanding cities as ecological

systems. Dr. Berkowitz and co-convenors Dr. Charles Nilon, Associate Professor at the University of Missouri-Columbia, and Ms. Karen Hollweg, Urban Program Manager for the North American Association for Environmental Education, challenged the 91 participants to open a dialogue from which would grow new collaborations and initiatives, new insights for existing projects, and new recommendations for developing, implementing and sustaining effective programs in urban ecosystem education and research.

Mr. Jack Shu, a Park Superintendent with the Office of Community Involvement, California State Parks, pointed out during



Convenors of the Eighth Cary Conference, left to right: Ms. Karen S. Hollweg, Dr. Charles H. Nilon, and Dr. Alan R. Berkowitz

the conference that sometime in the next decade the child will be born who will tip the balance of humanity from mostly rural to mostly urban. Dr. Berkowitz used this observation to summarize the purpose of the conference. "Urbanization is apparently the 'choice' of humanity," he said, "and, indeed, relatively high density settlements might be the most logical way to house people on the globe." Urban areas, Dr. Berkowitz explained, capture efficiencies of transportation and other services, foster community and fellowship, and minimize impacts on extensive parts of the Earth. "Our challenge, then, is to understand these novel — in evolution-

* Read about the Baltimore Ecosystem Study (BES) in IES newsletters 14:6, 15:5 and 15:6, or explore the BES links under "Research" at the IES website, www.ecostudies.org.

There's More to Orchids Than Meets the Eye

by Jennifer L. Purrenhage

When did you last visit the Fern Glen? If it was in late May or early June, you walked through woods studded with starflowers, carpeted with Canada mayflowers and framing clusters of lovely wild orchids, the yellow lady's slipper. Would you have suspected that these elegant orchids owe their well-being to an inconspicuous fungus?

People often think that all a plant needs to grow is water, sunlight and carbon dioxide, but many plants require more. A number of plants form relationships with other organisms in order to obtain nutrients that the plant alone cannot acquire. The mutually beneficial relationship between the mycelia — root-like hairs — of fungi and the roots or other structures of most flowering plants is known as "mycorrhiza". Through this partnership, the flowering plant obtains water, phosphorus, nitrogen, mineral salts and other materials from the fungus. Less is known about how the fungus benefits, except that it acquires carbohydrates from the host plant. Most native trees and herbaceous plants benefit from an association with mycorrhizal fungi, including lady's slippers. (Plants in the mustard and sedge families are examples of those that lack mycorrhizae.)

Members of the orchid family — from tropical species to the northern temperate lady's slippers — are interesting because, in nature, they require mycorrhizae for germination. A characteristic feature of orchids is the tiny seeds they produce. The advantage afforded by the small size is that it facilitates wind dispersal of seeds over relatively long distances. The disadvantage is that it provides only a limited capacity for nutrient storage, and nutrients are necessary for plant germination. The embryonic orchid is protected by a seed coat, except where it was attached to the ovary wall during development. This weak point is where fungus, which is ubiquitous in soil, enters and comes in contact with the embryo. Once contact is made, the embryo devotes some of its tissue to hosting the fungus whose mycelia branch out through the soil, collecting nutrients and transporting them to the slow-growing embryo.



Both yellow and pink lady's slippers decorate the Fern Glen in May and June.

Above, *Cypripedium parviflorum* var. *pubescens*, the large yellow lady's slipper.

All immature orchids rely on mycorrhizal fungi to reach the photosynthetic stage, when they can provide their own food. Mature orchids, however, vary in their dependency on mycorrhizae. Members of the genus *Cypripedium*, the lady's slippers, show a steady decline in their dependency from year to year, as their above-ground size increases. There are records, however, of mature plants that have gone dormant and bloomed again years later. This may be possible due to a continuous supply of nutrients from the mycorrhizal relationship.

For centuries gardeners have attempted to domesticate the lady's slipper by removing plants from wild colonies. For as long as they have tried, most of their attempts have failed. Mycorrhizal relationships between the orchids and their specific fungus are integral to the health of the plants, and without the necessary mycorrhizae, the orchid will more than likely die.

Ms. Judy Sullivan, IES Native Plant Gardener, knows the harm that avid collectors can cause, not just to orchid populations but to most native wildflowers. "Wild plant collecting can wreak as much havoc as many environmental pollutants can," she says. "It has caused extinction of some species and has drastically decreased diversity among others." For those orchid lovers willing to invest time and care, Ms. Sullivan observes that a few companies now provide very young clones that have been propagated by tissue culture and reared in a nutrient solution without ever being exposed to the fungus. These cloned plants will need proper soil and frequent fertilizing, but are certainly a preferable option to wild collecting. A list of suppliers is available in the IES Ecology Shop.

Jennifer Purrenhage is an AmeriCorps Member, through The Youth Resource Development Corporation. She is using this opportunity to work with the IES Native Plant Program.

Cary Conference, from page 1

ary terms — and increasingly universal systems so that we can make them healthy places for all the living things that dwell there, and so we can integrate them with the fewest possible impacts into other ecosystems, both nearby and distant, that they are linked to."

"Understanding Urban Ecosystems: A New Frontier for Science and Education" was the eighth in the Institute's biennial Cary Conference series and the first with an emphasis on ecology education. One of the meeting's strengths was the balance between, on the one hand, natural, physical and social scientists studying urban ecosystems, and, on the other, leading education researchers, administrators, practitioners and decision-makers who shape the teaching of ecology. During four plenary sessions, numerous small group discussions and two evening poster sessions where research and education programs in urban ecosystems were displayed and discussed, the scientists and educators expanded their horizons. "If everyone leaves with new

National Council of State Garden Clubs Honors Dr. Likens

At its recent Awards Banquet, the National Council of State Garden Clubs (NCSGC) honored Institute of Ecosystem Studies Director Gene E. Likens with its highest achievement award, the Award of Excellence. In her congratulatory letter to Dr. Likens, NCSGC Awards of Excellence Committee Chairman June P. Wood wrote that the award was in recognition of the scientist's "many outstanding contributions in the field of ecology and environmental preservation".

Dr. Likens was nominated for the NCSGC Award of Excellence by the local Dutchess Garden Study Club. Citing the ecologist's role in initiating the Hubbard Brook Ecosystem Study, his discovery of acid rain, and his accomplishments as IES director, the application concluded with recognition of Dr. Likens' ability "to quantify 'human accelerated environmental changes' and to communicate those facts to scientists, governing bodies, businessmen and layman alike."

Especially instrumental in preparing the application and compiling the supporting materials were Dutchess Garden Study Club members Priscilla deVeer of



Dr. Likens receives the National Council of State Garden Clubs' Award of Excellence from outgoing NCSGC President Barbara Barnett.

Millbrook and Margaret Marino of Poughkeepsie. They submitted their work to the Federated Garden Clubs of New York, of which the Dutchess Garden Study Club is a member, which in turn forwarded it to the National Council of State Garden Clubs.

Dr. Likens was notified of his award in January. In mid-May, he and his wife Phyllis Likens attended the Awards Banquet at the NCSGC annual conven-

tion, held in Atlanta, Georgia. After receiving the award, Dr. Likens gave a short presentation describing his work.

The National Council of State Garden Clubs, Inc. is the largest volunteer gardening organization in the world, with almost 8,500 clubs and over 235,000 members from 50 states, the District of Columbia and many international affiliates. Founded in 1929, its headquarters are on grounds adjacent to the Missouri Botanical Garden in St. Louis, Missouri. The goal of the NCSGC is to promote conservation of natural resources and environmental awareness. To meet this goal, the organization awards college scholarships; sponsors courses in environmental education, flower arranging, gardening study and landscape design; encourages good horticultural practices; promotes community service projects; sponsors outreach programs for youth and international affiliates; and encourages civic development, legislative advocacy and governmental relations. This year's convention was especially significant, as it celebrated the organization's 70th anniversary.



At a Cary Conference poster session: Above, "Power of Place: History, Schools and Water" by Ms. Anne W. Spirn (l), Professor and Director of the West Philadelphia Landscape Project, here with conference co-convenor Ms. Karen Hollweg. Right, Dr. Bruce W. Grant (r), Associate Professor of Biology and Environmental Science, Widener University, with his poster on "Campus Ecology" as a means to urban ecological literacy", and Dr. David B. Campbell, Program Director, Instructional Materials Development and Teacher Enhancement, National Science Foundation.

ideas, perspectives and motivations," said Dr. Berkowitz in his introduction to the final plenary session, "the organizers will be delighted."

A book growing from the conference and addressing

issues of urban research and education will be published in spring 2000. Contact Dr. Berkowitz (e-mail: BerkowitzA@ecosystemstudies.org; telephone: 914-677-5359) if you wish to be notified when it is available.

The Eighth Cary Conference took place from 26-28 April 1999. Cary Conferences have been held at the Institute every other year since 1985, each focusing on a different theme. Their purpose, unlike that of many scientific meetings, is to consider the process of science, rather than the detailed content, to help integrate and advance the discipline of ecology. In the opinion of Dr. Diana Wall, incoming President of the Ecological Society of America and Director of the Natural Resource Ecology Laboratory of Colorado State University, "The Cary Conferences have been extremely important in focusing science on new, emerging areas of ecology, bringing together notable scientists in a process of assessment and synthesis that is unique among conferences."

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Calendar

CONTINUING EDUCATION

For **summer 1999** program information, call the Continuing Education office at 914-677-9643. Programs during July and August include:

Gardening

July 24 & 31: **Fundamentals of Gardening**
Aug. 14: **Running Tapestries: Perennial and Annual Ground Covers**
Aug. 28: **Designing Gardens with Form and Texture**

Landscape Design

July 17: **Designing Natural Landscapes**
Aug. 7: **Quick Sketches of Landscapes***
Aug. 14 & 15: **Transit and Level Use for Landscape Construction - Extended**

Natural Science Illustration

July 17: **Summer Garden Flowers in Pastels**
July 31 & Aug. 1: **Sketching in the Garden: Wethersfield and Innisfree**
Aug. 7: **Quick Sketches of Landscapes***
(* this class serves as an elective for both the Landscape Design and Natural Science Illustration certificates)

Nature Photography

July 17 & 24: **Looking at the Garden Through a Lens**

Ecological Excursions

Aug. 20: **Canoe Exploration of the Constitution Marsh at Sunset**
Aug. 21: **A Walk in the Forest Canopy**

IES SEMINARS

Free scientific seminars are held each Friday from September until May.

VOLUNTEER OPPORTUNITIES

Current Needs

Education Program Office: weekday telephone reception

IES Ecology Shop: weekday and weekend visitor orientation and/or customer assistance

Perennial Garden: weekday garden maintenance

Call Ms. Su Marcy at 914-677-7641.



Cover of the "Hudson River Field Guide", illustrated by Linda Beckwith McCloskey.

ART EXHIBIT

Illustrations by Linda Beckwith McCloskey are on display in the Plant Science Building lobby. Four of the seven drawings in the exhibit are original plates from the *Hudson River Field Guide to Plants of Freshwater Tidal Wetlands*, published by the NYS Department of Environmental Conservation. Ms. Beckwith McCloskey is a student and instructor in the IES Natural Science Illustration Program. This exhibit is open weekdays from 9-4. Admission is free with a visitor permit.

IES ECOLOGY SHOP

New in the Shop ... Hudson Valley notecards by Linda Hubbard ... pewter picture frames ... IES all-cotton baseball caps ... **for children** ... "A Year of Discoveries" - a calendar for kids to create ... science and nature activity books ... **and in the Plant Room** ... 'mud gloves' ... gardener's tool organizer ... kneelers and knee pads
Senior Citizens Days: 10% off on Wednesdays
• *Gift Certificates are available* •

GREENHOUSE

The IES greenhouse, a year-round tropical plant paradise and a site for controlled environmental research, is open until 3:30 p.m. daily except public holidays. Admission is by free permit (see HOURS).

HOURS

Summer hours: April 1 - September 30
Public attractions are open Mon. - Sat., 9 a.m.-6 p.m. & Sun. 1-6 p.m., with a free permit.
(Note: The Greenhouse closes at 3:30 p.m. daily.)
The **IES Ecology Shop** is open Mon.- Fri., 11 a.m.-5 p.m., Sat. 9 a.m.-5 p.m. & Sun. 1-5 p.m.
(The shop is closed weekdays from 1-1:30 p.m.)
• *Free permits are required for visitors and are available at the IES Ecology Shop or the Education Program office daily until 5 p.m.*

MEMBERSHIP

Join the Institute of Ecosystem Studies. Benefits include subscription to the newsletter, member's rate for courses and excursions, a 10% discount on IES Ecology Shop purchases, and participation in a reciprocal admissions program. Individual membership: \$30; family membership: \$40. Call Ms. Laura Corrado in the Membership Office at 914-677-5343.

The Institute's Aldo Leopold Society

In addition to receiving the benefits listed above, members of The Aldo Leopold Society are invited guests at spring and fall IES science updates. Call Ms. Jan Mittan at 677-5343.

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